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IT has been satisfactorily demonstrated that it is impossible to build a tenement house on a city lot, 25 by 100 feet, in such a manner as at the same time to secure for its owners a profitable investment, and for its occupants all the requirements of physical and moral health. Of course the best result of a competition of plans, which can have no better culmination than the ingenious designs which we reproduced last week from the *Plumber and Sanitary Engineer*, should be a legislative enactment forbidding the erection of buildings under similar conditions. We understand that the committee appointed at the meeting called by the mayor of New York, to consider the question of tenement house reform, has recommended some legislation to promote decency of living among the poor, and we trust that we shall find among their propositions some such provision as we have named. We now learn that another and no less admirable issue of this movement for reform is the formation of an association in New York, to build tenement-houses somewhat on the plan of the Peabody tenement-houses in London. This association is to be a stock company with a capital of a million dollars; of which, when the organization is completed, ten per cent is to be paid in and devoted to the building of a model tenement-house; if this proves a profitable investment, it will be followed by a second call of ten per cent, and a second building; and so on until the capital stock shall have been expended. Of the profits above six per cent one third is to be distributed among the best tenants, to encourage cleanliness of living and promptness of payment; and the other two thirds will constitute a reserve fund for the erection of other buildings. This proposition seems in intention to be wise, practicable, and business-like; but the whole success of the enterprise must be largely influenced by the character of the first experiment.

THE first model tenement-house proposed by this organization is to be built somewhere between Sixtieth and Eightieth Streets, and between Second and Ninth Avenues, in the city of New York, upon sixteen city lots at the end of a block, thus giving a frontage of 200 feet on three streets. It is proposed to build five stories, with a central courtyard 100 feet square accessible directly from each of the three streets, to have ample stairways and passages, several elevators, all rooms to be large and lofty, and to receive direct light and air from the street or the court, and the side towards the middle of the block to be recessed in the centre so as to afford an area for air and light to the apartments facing in that direction. The building is to be in charge of a janitor who will enforce all necessary sanitary measures. The drying of clothes is to be done on the roof, which is to be surrounded by a parapet of brick six feet high. We understand that no definite plans have as yet been submitted. But, if we must have a competition of plans, no better programme than this could be opened, none in which the exercise of ingenuity and skill could have a more abundant opportunity, and be followed by results more useful and important to public health and morals.

THE special legislative committee which has been investigating the condition of the dome-piers of the Hartford Capitol has rendered its report to the General Assembly, and has given its verdict in accordance with the facts we have already stated. After recounting the manner in which the piers were built, altered, rebuilt, and at length repaired, and after stating that the immediate cause of the spalling and disfiguring of the granite was the substitution of narrow joints laid with lime paste, for wider joints laid with cement mortar, the committee goes on to say that "while the evidence shows that the chief and almost the entire direct responsibility for the defects in the dome-piers falls upon the deceased superintendent," it is also of the opinion that "the contractor was bound to have ascertained definitely whether the superintendent had any authority from his superiors for making the extraordinary and most dangerous changes, against which the contractor so properly and persistently remonstrated;" or that failing to have ascertained this, he ought to have refused to do bad work on the piers. Behind this condemnation of the superintendent and censure of the contractor it is barely possible to discern an implied censure of the Commissioners and the consulting engineer for negligence. We do not know whether this is the end of the matter, or whether suits will be brought against the estate of the superintendent or against the contractor and his bondsmen, but if anything of this sort is done, we cannot help feeling that the consulting engineer and the Commissioners ought to be made parties to the defence.

MR. BATTERSON'S defence before the investigating committee was an able and, in the main, a very temperate argument, and deserves mention, as it brings to light some curious statements. Because Mr. Batterson, who afterwards became the contractor, had submitted designs for the capitol in the first and second competitions, and might think himself entitled by this fact to express an opinion as to how the building should be carried out, it was thought best to bind him with the utmost stringency to the mere execution of the work specified by the architect or directed by the superintendent, who by the terms of the same contract was clothed with unusual power, for he, and not the architect who prepared them, nor the contractor who was to execute them, nor yet the commission which was to be ultimately responsible for their proper execution, was made the sole interpreter of the plans and specifications. When it was decided to build a dome, instead of a clock-tower, the sections of the specification which were to govern the construction of the tower were useless, and the cost of all labor and material which would have been expended on its construction was charged to the contractor as "omitted work," while the architect prepared new specifications for the dome. This the contractor, with a seeming justice, construes as an abrogation of that part of the specification which called for such labor and material. The Commissioners have sought to throw the responsibility for the failure upon Mr. Batterson for having disregarded certain things required only by the first specification; while Mr. Batterson maintains that this specification having in a manner been annulled, and having become, as far as he was concerned, only a matter of debit and credit in his ledger, he cannot be held derelict of his duty. But he goes too far: for he also declares that as the commissioners, although they profess never to have cancelled the first specification, formally adopted the new specification, they are bound by its provisions, while he himself is not bound by its conditions, inasmuch as it was never delivered to him. Mr. Batterson, then, voluntarily places himself in the position of a contractor who executes an important and costly piece of work on the authority of verbal instructions from a superintendent, and this in the face of the fact that the drawings and specifications are made part and parcel of the contract, on the proper execution of which depends his remuneration. The logical inference to be drawn from this position of Mr. Batterson is that, professing to feel himself unbound by the first specification, and maintaining that the requirements of the second specification are of no effect as far as he is concerned, he has been doing work for which he has not a contract and for which consequently he cannot claim payment.

THE Boston Chapter of the American Institute of Architects has, by invitation, united with the Boston Art Club and with the School of Drawing and Painting, with the object of holding a general exhibition of contemporary art in the new wing of the Museum of Fine Arts in that city, which has for this purpose been generously placed at their disposal by the trustees. An unusually

large proportion of the space available has been assigned to the architectural department of the exhibition, and it is important to the profession to justify this recognition of its position in art by a generous contribution of such drawings and designs as shall illustrate the present condition and aspirations of American architecture. To this end the Boston Chapter has sent to the profession in its neighborhood, as well as to the secretaries of the chapters in other cities, for appropriate distribution, a circular, which we print elsewhere, setting forth the objects of the exhibition, soliciting the coöperation of the profession in all parts of the country, and explaining the conditions of delivery and of return of contributions. The exhibition is to open April 22, and no contributions can be received after April 12. An opportunity so conspicuous for increasing the public interest in works of architecture and decoration should not be allowed to pass by unimproved. It is worthy of observation, by the bye, that the general presumption in the profession that only pictures of architecture, and not plans, geometrical elevation, sections, and details, are acceptable to the public is not sustained by facts. The unexpected general interest evinced in the exhibition of the competitive plans for tenement-houses in New York seems to show that pictorial demonstration is not the only way by which architecture can make itself interesting to the laity.

If fire-proof building is to become the rule in this country, it will be brought about quite as much through the demands of the different boards of fire underwriters as through the efforts of architects; for even the most reckless American, careless as he may be of the lives of his tenants and the rights of the owners of neighboring buildings, can understand the disadvantage of insuring at high rates, or perhaps of not being able to insure at all. It is for the pecuniary interests of the companies represented by these boards that a better style of building should be enforced, and they have taken up the matter in a purely mercantile spirit, and have made investigations and experiments which have been of very great interest and value. It is quite possible that they could in time bring about the desired reform in building unaided, though it is not for the honor of the profession that they should move forward alone. The latest step towards protecting their own interests, which in a different way are the interests of the public, has been taken by the New York Board of Underwriters, which has petitioned the mayor of Brooklyn to veto the action of the aldermen in resolving to replace with naphtha lamps the present gas-lights on the streets and public places. Aside from the objectionableness of returning to an obsolete method of street lighting, which after all may not prove more economical than the present system, since more lamp-lighters will be needed to do the work, the proneness of naphtha to burn badly in very cold weather, and the danger of explosion of single lamps, or of any of the many places where each lamp-lighter must store his supply of the dangerous fluid, the Board says that it is well assured that the fire loss will be increased $200,000 per annum, and consequently the insurance rates must be raised. In this connection it is well to recall that the incendiaries who have lately caused such a panic in Columbus, Ohio, that the military were called out, have confessed that they obtained from the street lamps the naphtha they used.

Our summary of news would be incomplete without the usual record of disaster from shoddy building. This time we have a demonstration from Louisville, Ky., where, on the night of the 16th inst., a new tobacco warehouse, containing about 300 hogsheads of tobacco, collapsed and fell into ruin. The local journals say that its walls had been considered dangerous, but that "several engineers" had pronounced the structure perfectly safe. It is commendable, of course, in the owner to proceed immediately to rebuild or repair, as the papers have it, so that the business of his tenant may be interrupted as little as possible; but we as yet hear no word of indignant rebuke at the criminal poverty of the building, or at the criminal carelessness of the builder, and nothing is said of any intention to build better. We shall be happy to record the proceedings of a prompt and thorough inquest into the causes of the disaster, and a prompt punishment of the delinquents through whose avarice, or carelessness, or short-sightedness, it became possible.

The Paris *Economiste Française* gives some ingenious statistics having a bearing upon the opening of a canal through the Isthmus of Darien, and its influence upon the commerce of America and Europe. From these it appears that ships of our Atlantic coast would, by the use of the proposed canal, gain thirty-three per cent over those of England in the voyage to San Francisco, twenty-eight and thirty-two per cent respectively in the voyage to Shanghai and Hawaii, forty-eight per cent to Valparaiso, and fifty-one to Callao; where now this advantage is ours by only from three and a half to seven per cent. The substitution of steamers for sailing vessels would add forty-four per cent advantage for Atlantic over European tonnage. The use of this route would thus not only enable us to obtain all our goods from Pacific ports direct, and greatly encourage our trade, but would render it possible for ships starting from American ports to load in China or Valparaiso, and deposit their cargoes in Liverpool a week in advance of ships starting on the same errand from English or French ports. With this advantage, it is argued, all the commerce of the Pacific would flow into this channel and contribute directly to the establishment of an American supremacy in the largest trade in the world. It is contended, therefore, that even with the assistance of M. de Lesseps, it will be impracticable to induce English capital to venture on the enterprise of opening this canal as proposed. It would not only inflict a permanent injury on British commerce in this direction, and depress the value of the Suez Canal, but, as the Philadelphia *North American* claims, by facilitating the introduction of American manufactures into Western South America, and into China, Japan, and Australia, it would ruin the manufactures of Great Britain. Apparently, no great public enterprise now contemplated can be compared to this in the importance of its results to our commercial prosperity. The physical possibility of it we have more than once had occasion to refer to, and now, if these magnificent predictions shall prove capable of verification, our duty to undertake this task ourselves, and not to wait for the assistance of foreign capital, would seem to be plainly set forth.

What to do to preserve the famous paintings by M. Paul Baudry, which form the most attractive feature of the too magnificent *foyer*, or crush-room, of the New Opera House at Paris, is still to be decided. Beyond question they are being injured by the smoke and heat from the gas which lights the room; equally beyond question, as it seems to us, they are unfortunately placed and unsuited to their surroundings, for it is very difficult to get a satisfactory view of them, and when they are seen, one is possessed with disappointment that the strong color and gorgeousness of the rest of the room so seriously interferes with one's enjoyment of paintings which are in themselves beautiful and harmonious. This want of harmony between the room and its principal decoration betokens a serious blunder which must be shouldered either by M. Baudry, because he disregarded the key of color fixed by the architect, or else by M. Garnier, if his part was done after the key had been fixed by M. Baudry's work. Several remedies are proposed, for it is now evident that in six or seven years more the damage will be irreparable. One scheme is to glaze the paintings with some varnish which can resist the attacks of heat and acid gases; but this is thought to be impossible without destroying the artistic merit of the work. The scheme of replacing the paintings by mosaic reproductions has been tried, but the medallion which was reproduced was so grotesque that the idea has been abandoned. Still another scheme is to replace M. Baudry's paintings by more ordinary decorations, the work of the scene-painter. Giving up gas and using the electric light is more favorably considered; for although the Jablochkoff candle is too clumsy for such a place, the Reynier lamp can be made to take a form in harmony with the surroundings; moreover, the predominance of violet rays in the electric light can be counteracted by using globes of such a color as will intercept the superfluous violet rays. This seems a very satisfactory solution, and, provided the subdivision of the electric light can be properly accomplished, may be adopted.

Still another scheme, one which is favored by M. Baudry himself, is to remove the paintings to some building, the Hôtel de Ville or the Tuileries, for instance, where they can be more suitably installed, while accurate copies can be prepared for the *foyer*. The only artist who, unaided, could satisfactorily replace these paintings, which cost forty-eight thousand dollars, is M. Baudry himself, but this task he does not for a moment think of undertaking. He offers, if the sum of twenty thousand dollars is placed at his disposal, to have good copies prepared

under his personal supervision by the following method: The large photogravures of the original panels, which were prepared by Goupil & Co. before these panels were put in place, are to be accurately colored, as indeed they have been already with remarkable success, and then copied upon canvas, the enlargement being made in the ordinary way by division into squares; while the outlines can be transferred to canvas by the aid of the magic-lantern, as at Albany. The matter of coloring the copies can safely be entrusted to the pupils at the École des Beaux-Arts, under M. Baudry's eye. This process will insure absolutely faithful reproductions, for all the distortions of figures and accessories which the artist provided, to counteract the distortions which curved vaults and coves would otherwise have caused, are accurately represented by the heliogravures. Meanwhile, while it is yet undecided which course to pursue, the paintings are to be engraved on copper at the expense of the Government.

THE OPEN FIRE-PLACE. IX.

THE MOVABLE GRATE.

FIG. 63 represents the movable grate, invented by Bronzac. The fuel rests on a small carriage with wheels or casters, which allow of its being brought forward into the room, when the fire is once lighted and burning well. The grate or carriage consists of a cast-iron box, open in front, and was used with an ordinary fire-place of Lhomond or Rumford. These grates, according to Peclet, well made at first, met with great success, but upon the expiration of the term of the patent right their construction was less careful, and they fell into comparative disuse. At the Universal Exhibition of 1855, an apparatus of the same nature was exhibited. The grate could be brought forward several meters into the room, the smoke then passing into the chimney through a flue formed of sliding tubes, fitting into each other like those of a telescope. As to how far the use of such a device is likely to spread in our modern apartments is a question of which each is best able to judge for himself. But it seems to the writer more suitable for the shop of the tinsmith or the laboratory of the chemist than for an ordinary living-room.

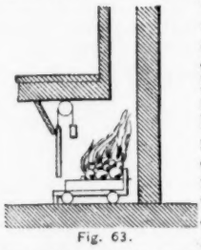


Fig. 63.

Various other forms of the movable grate have been invented, a common form among which is the hanging-basket grate, now occasionally used, supported by a chain on a swivel bracket projecting from one of the jambs of the fire-place. This form of grate is objectionable on account of the difficulty of holding it firmly while replenishing or poking the fuel. It is sometimes used on account of its oddity or picturesqueness.

FIRE-PLACE WITH INVERTED SMOKE FLUE.

In 1745 Franklin invented the famous Pennsylvanian Fire-Place (Fig. 64), in which the smoke descends to the bottom of the fire-place before it enters the flue, in order to heat the surfaces of the fresh air channels enclosed in the fire-back. This fire-place of Franklin's, however, was closed in front, and was objectionable on that account, the fire not being visible. It belongs therefore rather to the stove family than to that of the fire-place, as its name implies. It was modified by Desarnod, who opened the front to expose the fire (Fig. 65), and added on each side three little tubes which entered a larger one, through which the smoke passed and gave out a large part of its heat before entering the chimney. In short, the apparatus consists of a small fire-place inside of a larger one. Above the smaller is the opening through which fresh air enters the room. The system of an inverted smoke flue was also adopted by Montalembert, who in 1763 invented the fire-place and chimney represented in Fig. 66. It consists of a small chimney inside of a larger one. Upon lighting the fire, the damper at the top of the inside flue is opened, and that on the outside flue closed, by means of cords and tassels, allowing the smoke to rise directly into the chimney. Once the fire is well lighted, the dampers are reversed and the smoke is forced to follow the course indicated by the arrows. When the walls of these flues are constructed of a good heat-conducting material, the saving by their use may be very great; if constructed of brick and the usual furring put upon the chimney breast the gain is, on the contrary, but slight. Notwithstanding this objection and the complication of the construction, these chimneys became quite popular at the time of their introduction.

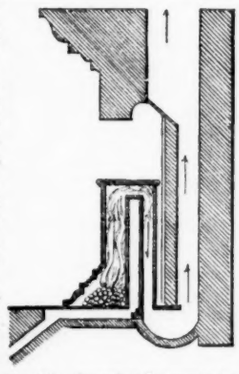


Fig. 64. Franklin's Pennsylvanian Fire-Place.

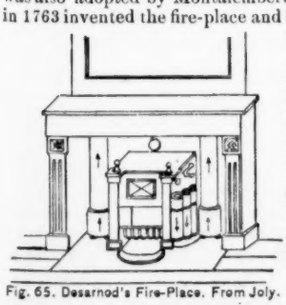


Fig. 65. Desarnod's Fire-Place. From Joly.

The chief difficulty with all these arrangements having the reversed draught is their liability to smoke, and to clog with soot. Where the principle of multiplied circulation is employed to bring the fresh air and smoke flue in contact with each other, the circulation should if possible be on the part of the fresh air and not of the smoke, unless convenient openings can be provided for cleaning out. Another form of fire-place, constructed on the same principle, is that of Douglas Galton, represented in Figs. 67 and 68. In this the fire-place projects entirely into the room. The smoke passes through the large central flue, and is surrounded by fresh-air chambers, which bring the warm air into the room through the openings shown in the section at the top of the stove, following the direction shown by the arrows. The fire-place is constructed of fire-brick, which absorbs a great quantity of heat, and, when once thoroughly warmed through, has the peculiarity of radiating the heat in all directions very rapidly. Soapstone has the same property.

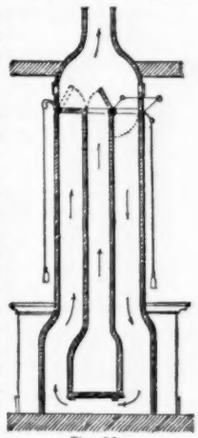


Fig. 66.

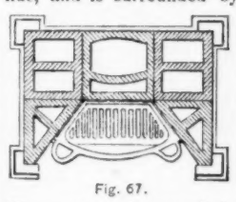


Fig. 67.

The grate and case of the fire-place are made of iron. This apparatus can only be employed with safety where the chimney draught is very regular and powerful, the vertical flue being heated from some external source, as in the Herbert Hospital, Woolwich, England, where, by the side of the upright flue, is placed a spare flue terminating in a fire-place in the basement, which enables the vertical flue to be warmed, so as either to make it draw when the fire is first lighted, or to enable a current to be maintained for ventilating purposes through the fire-place when the fire is not lighted. The horizontal flue is swept by pushing a brush along it to force the soot into the vertical flue, whence it can be removed by a special contrivance.

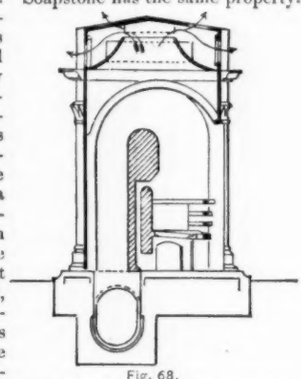


Fig. 68.

The fire-place of Descroizilles, with smoke flue constructed on the same principle, is shown in Fig. 69.

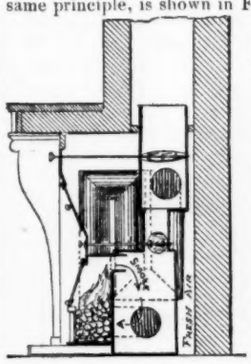


Fig. 69. Fire-Place of Descroizilles.

In order to diminish the unnecessary entrance of cool air into the chimney flue above the fire, without at the same time curtailing the view of the flame, Descroizilles closed the upper part of the opening with a curtain of fine metal gauze. This, applied to both wood and coal fires, gave excellent results. Glass and mica slate have been used for the same purpose, but, owing to their frangible nature, have had but a limited use. The apparatus for warming the fresh air shown in the figure is much too complicated ever to become popular, even if it were not objectionable in many other particulars. The whole is constructed of metal. The metal gauze in front of the fire is made to turn on a hinge on its upper side, so that it may be opened or closed at pleasure. The smoke is allowed to pass directly into the chimney when the fire is first lighted, but when the flue has been sufficiently warmed to insure a good draught, the small damper above the fire is closed, and the smoke is compelled to descend, turn to the right and left, rise again, and circulate through the bent pipes as shown in full and dotted lines, before it finally escapes into the chimney. While the machine is in good order it warms the fresh air economically and effectually, provided it is not attempted to warm too much air. But it is particularly liable to clog with soot, and very difficult to clean out again, it being necessary to take it entirely apart in order to do this. Moreover, the frequent changes in shape and direction of the various parts of the smoke flue give rise to numerous counteracting eddies, which seriously retard the passage of the smoke; and often to such a degree that, with fire-places having openings of the ordinary size for burn-

ing wood, its use, without the gauze blower, would be quite out of the question.

Fig. 70 gives a simpler device, but one which is also objectionable on account of back eddies, soot clogging, and smoke, without the advantage of the damper leading into the direct flue to fall back upon when the draught is feeble.

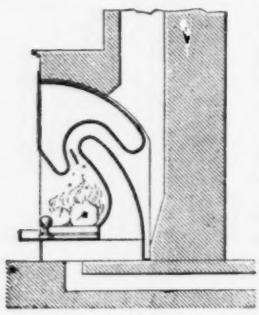


Fig. 70. From Peclet.

Figs. 71 and 72 represent a ventilating fire-place taken from Peclet's Traité de la Chaleur. It is composed of a small fire-place of sheet-iron, placed inside of a larger one containing the fresh air tubes, T T. These tubes are arranged in plan as shown in Fig. 72, in such a manner as to take from the smoke, as it passes between them, as much heat as possible, without obstructing its passage or occupying too much space. The small inside fire-place is distinct from the larger one containing the tubes, so that it can easily be removed

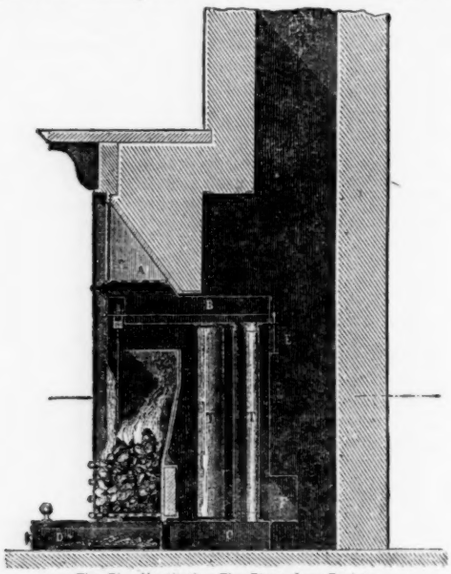


Fig. 71. Ventilating Fire-Place, from Peclet.

when it is desired to clean out the latter. The smoke and hot air of combustion, rising from the fuel, pass over the back of the inside fire-place, descend between the fresh-air tubes, and pass out into the

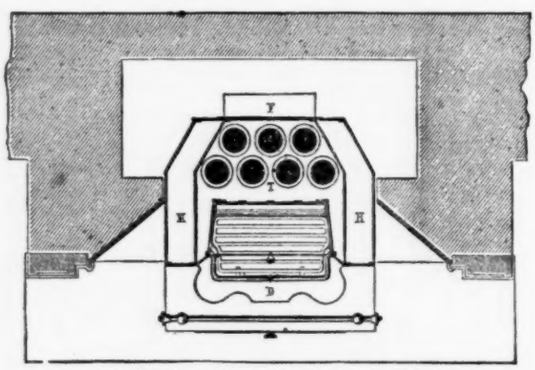


Fig. 72. Plan of Ventilating Fire-Place, from Peclet.

main flue through the large opening at the bottom, F. An opening above E, furnished with a damper, serves to establish the draught when the fire is lighted. The fresh air circulates through the tubes and enters warmed into the room through a register just above the fire. The usual blower for diminishing the size of the fire-place opening accompanies the apparatus. This fire-place is simple and easily set in any ordinary chimney opening. It was tested by Peclet and highly recommended by him.

The reverberatory fire-place, invented by a Mr. John Taylor, an English architect, is represented in Fig. 73. It is constructed of hollow bricks laid round an iron frame in such a manner that the smoke is obliged to pass around and below the fire before ascending the flue. An opening with a damper immediately above the fire allowed the smoke, however, to rise directly into the main flue when the fire was first lighted. The interior of the grate was entirely lined with hollow fire-bricks, and the front part of the grate was provided with openings arranged to correspond with the construction of

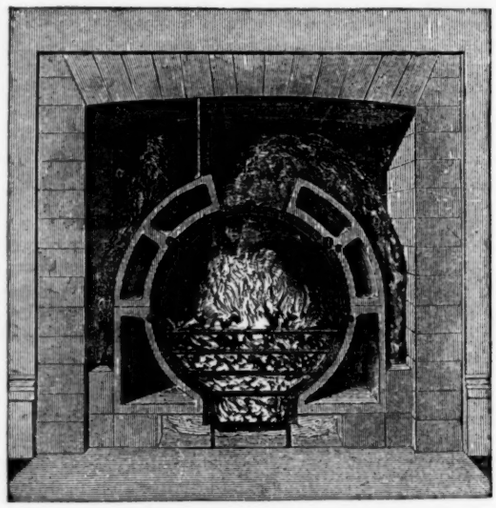


Fig. 73. Taylor's Fire-Place.

the air flues behind, and also to present a highly ornamental appearance. The fresh air warmed in the hot-air flues formed of fire-bricks passed through these openings into the room. This hollow brick interior was heated by the fire resting against the bricks and by the smoke passing around them. The objections to this fire-place were, that the descending flue as here constructed would be liable to smoke, and would quickly become clogged with soot, to remove which would be difficult, especially in the lower corners, where it would soonest condense. Another serious objection was the liability of the hollow bricks to become destroyed by the action of the fire and disturb the whole arrangement. This might be partially removed by the substitution of iron for brick, but such a substitution would involve difficulties of other kinds. On the whole, the deficiencies were conspicuous enough to prevent its making a permanent impression, and it now appears to have become forgotten.

M. Joly, in his Traité du Chauffage et de la Ventilation, says, "When we make a careful examination of our open fire-places as we actually find them, the first thought which strikes us is, 'How absurd they are!' They are indeed nothing more than excellent producers of dangerous draughts, and it is particularly to them that applies the famous proverb, —

'*Si le vent souffle sur toi au travers d'une fente,*
Fais ton testament et mets ordre à ta conscience.' [1]

"The second thought is this: Why not take advantage of the heat at the point where it is most intense, that is, at the top of the fire-place? Why cause the smoke to enter the main flue at a height of 0 meter .70 from the ground, rather than at the height of 1 meter? Why not utilize first all the radiant heat, and then by means of a damper in the smoke-flue just over the fire (Fig. 74), when the fire is lighted and the draught established, why not, as in the Russian and Swedish stoves, turn the smoke into one of the idle piers under the mantel, converting it into a reversed smoke-flue, to lead the smoke under the hearth to the base of the other pier, through which it again rises to the mantel and returns to its starting-point before entering the flue? Why not bring all this smoke in contact with fresh air introduced from the outside, and entering the room through the fresh-air registers, as shown at the right and left of the mantel? This would be more expensive than our ordinary fire-places; but does the fuel that one burns cost nothing? Do we derive from it all the advantage of which it is capable?"

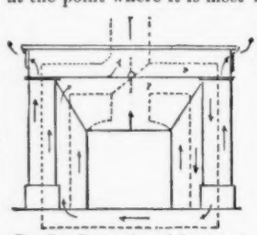


Fig. 74. Suggestion of Smoke Circulation.

THE ILLUSTRATIONS.

BUILDING FOR THE YOUNG MEN'S CHRISTIAN ASSOCIATION, GERMANTOWN, PENN. MR. T. RONEY WILLIAMSON, ARCHITECT, PHILADELPHIA.

The building has a front 90 feet long, and will be the most important edifice in the town; the materials are brick and stone. The ground floor piers, the principal doorway, and the finish at the bottoms of the window bays will be a gray local stone, very soft in tone and partaking something of the nature of the soap-stones as to

[1] If through a crack the draught you feel,
Settle your conscience and make your will

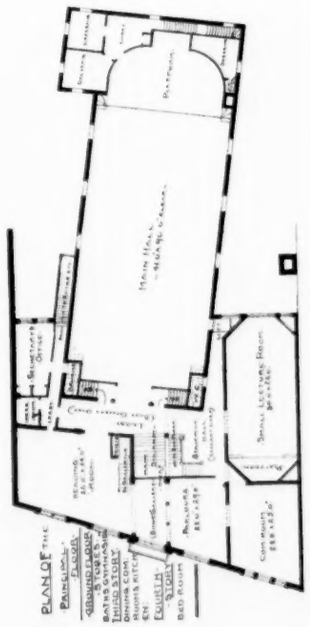
American Architect and Building News Mar. 29, 1879.

No. 170.

·· BUILDING FOR ··
·· THE YOUNG MENS ··
·CHRISTIAN ASSOCIAT'N·

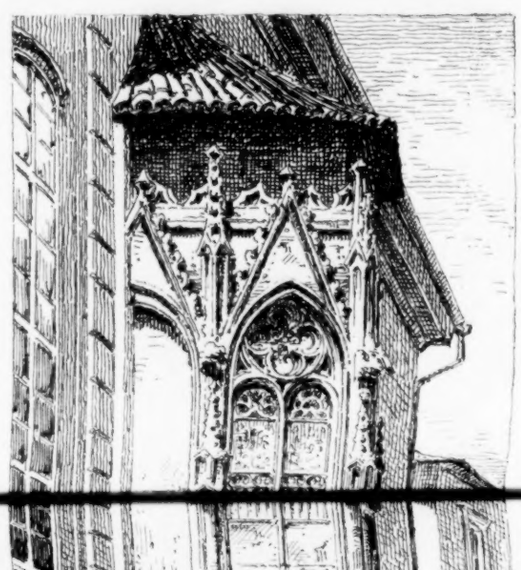
T RONEY WILLIAMSON · ARCHITECT · PHILA·

'GERMANTOWN · PHILADELPHIA·

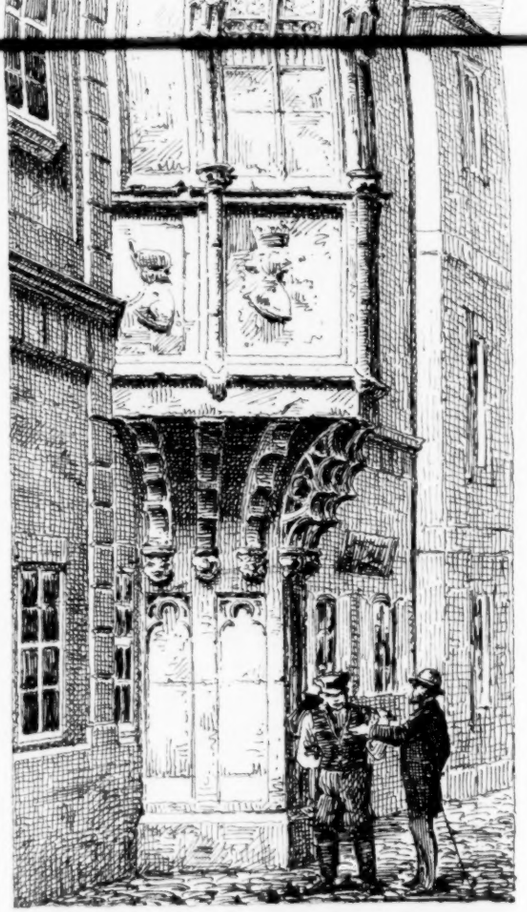


THE HELIOTYPE PRINTING CO. 220 DEVONSHIRE ST. BOSTON.

OLD FARMHOUSE IN SÆTERDALEN ✻ NORWAY ✻ [BUILT IN THE YEAR 1650]



A STREET IN KOLMAR • ELSASZ • GERMANY

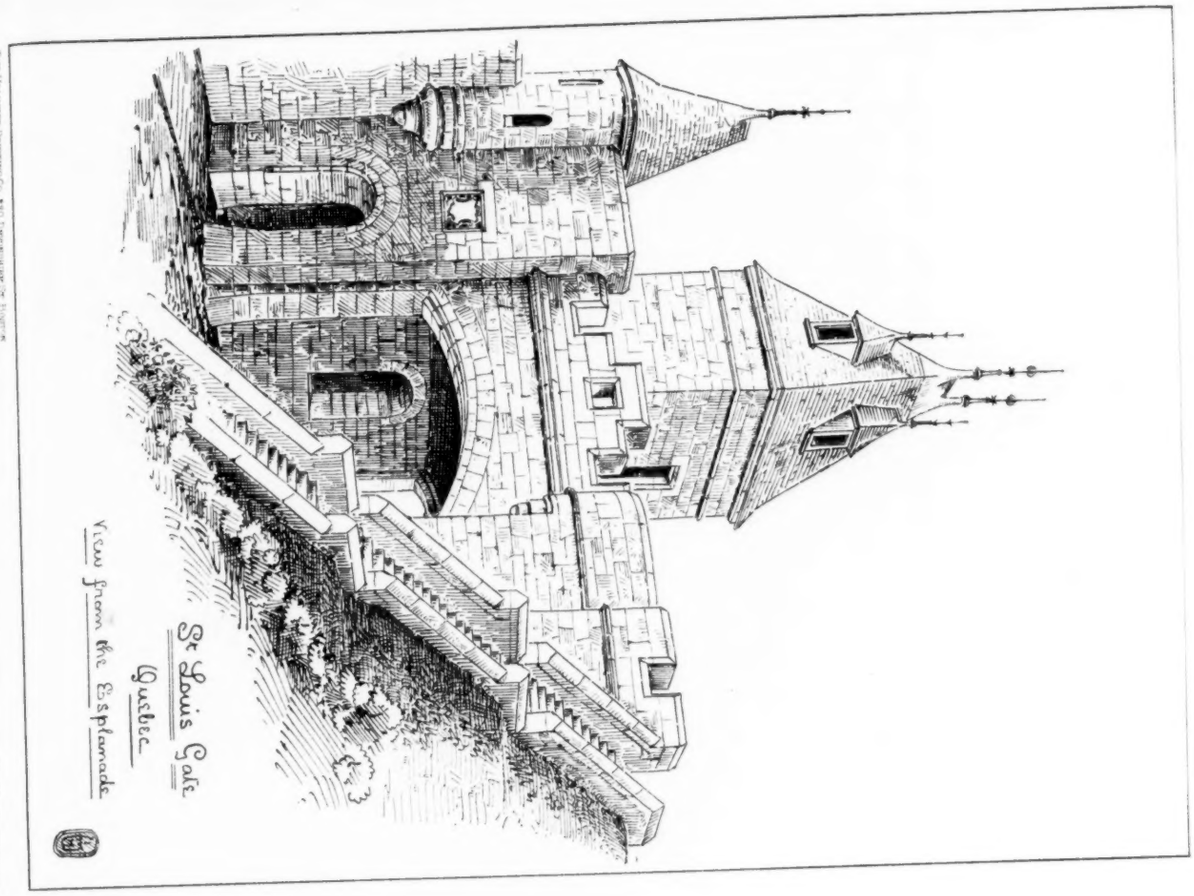


BAY WINDOW FROM THE "CAROLINUM" PRAG

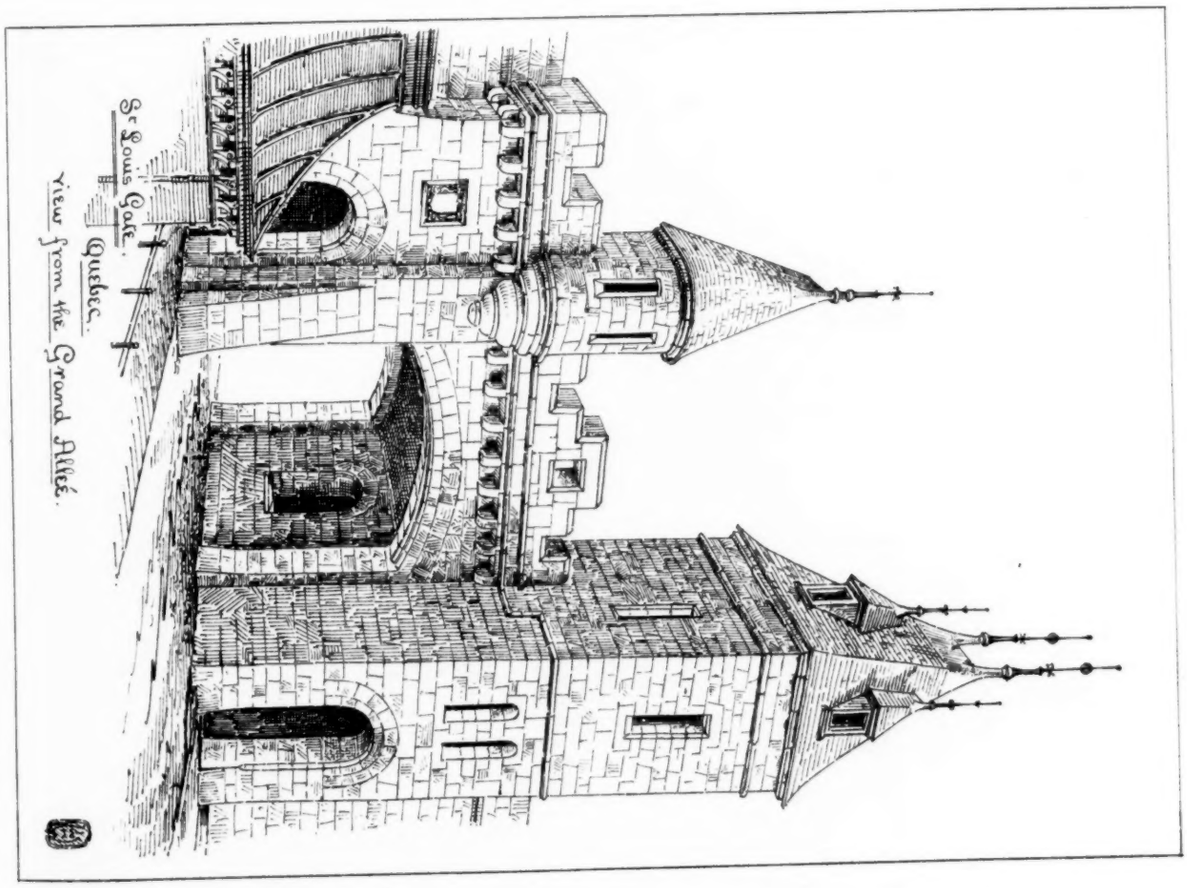
* * * * * SKETCHES FROM A SCRAP BOOK L.S.IPSEN DEL. * * * * *

THE HELIOTYPE PRINTING CO. 220 DEVONSHIRE ST. BOSTON

THE HOLLOWAY PRINTING CO. 820 THOROUGHFARE ST. BOSTON



St Louis Gate
Quebec
View from the Esplanade



St Louis Gate.
Quebec.
View from the Grand Allée.

quality. The rest of the front, strings, caps, cornices, dormers, etc., will be brick, made by the Peerless Brick Co., Philadelphia.

SKETCHES FROM A SCRAP-BOOK. MR. L. S. IPSEN, ARCHITECT, BOSTON.

ST. LOUIS GATE, QUEBEC, CANADA. MR. THOMAS S. SCOTT, CHIEF ARCHITECT TO THE DOMINION GOVERNMENT.

This gate is to be erected on the site of old St. Louis Gate. The style of architecture is adapted to harmonize as far as possible with the existing fortifications. It has a central roadway passage under a segmental arch for general traffic, and a semicircular archway on either side for foot passengers. These roadways and footways form with the fortification wall a continuous promenade. On the front and rear walls are embattled stone parapets corbelled outwards from the face of the walls, and on either end are stone steps leading to the city streets. The stone tower, with pyramidal dormered wooden roof, projects nearly two thirds outwards from the general face of the wall. Opening on the platforms are two corbelled stone turrets of horseshoe plan, one of them being covered with a slate and lead roof.

SOME PROFESSIONAL TRIALS AND TRIBULATIONS.

ARCHITECTS are often placed in a position nowadays that must bring home to them very forcibly the old story of Columbus and the egg. In the good old times, like other professional men, and like the tradesmen and artisans also, they were members of guilds or corporations whose prestige and high standard of ability were jealously guarded, and each individual had at his back the whole weight of the body to which he belonged. Then no man questioned that an architect knew more of building, or a shoemaker of making shoes, than himself; but *nous avons changé tout cela*, — and now when an architect claims to know more about his profession than does his client, he does so in a rather deprecatory manner, not in the hope of convincing the client, but merely to set himself right with his own conscience.

What architect has not had clients who came to him with a painfully elaborated, impossible sketch, saying, "Now this is about my idea of a house. I wish you would make me a design that would embody it in a practical form." The architect takes such a sketch and remodels it, endeavoring to satisfy all the requirements, and making of it, in the end, a creation entirely his own, which he presents to his client, who exclaims, almost invariably, "Why, how simple! any one could have done that!" and makes up his mind that architecture is a very easy business. Or again, an architect inquires about some work that excites his interest or admiration, as having architectural merit, and is answered, "Well, Mr. So-and-So was our architect, but we really did not need him; my wife was the real designer, and the good points of the house are all her ideas."

Of course it is not pleasant to have one's thunder stolen in such a manner, and the unfortunate architect who has twisted and turned his plans and put one tracing over another, in trying to reconcile the ideas of his client's wife with themselves, with each other, and with his design, is tempted to vow that in future he will reject on principle all ideas brought forward by his client's wife, or any of his female relatives; or, — a more dreadful vengeance still, — that he will let madam design the house herself. It is the only redress he can hope for, as, when such a version of his services is given, it is more generally believed than would seem possible, in view of its improbability, and he has few opportunities to justify himself.

But there are other instances where architects are subjected to more serious wrongs and annoyances, and which are seemingly as difficult of redress. An architect is invited, for instance, together with a number of other architects, to submit designs for some large building; the architect whose design proves the most acceptable to the owner or client is to be appointed architect of the building, and to carry out his design; the other competitors are to be paid a fixed sum, avowedly based, under the most liberal arrangements usually made, upon the amount of time and labor required to produce the drawings. In due time the designs are submitted to the owner, or his representatives, one of them is selected, and its author appointed architect, the other designs being returned to their authors, with the stipulated compensation. So far our architect, whom we will suppose to be one of the unsuccessful competitors, has nothing to complain of, unless, indeed, he has reason to believe that other considerations than the competence of the competitors and the merits of their design were allowed to influence the choice of the owner, a contingency which we will not consider here. The building goes on, and our architect returns to his own affairs, but discovers, during or after the erection of the building, that certain essential features, which at the time of the competition only appeared in his drawings, have been embodied in the new building. Now, what position can he take in the matter; has he a right to feel that he has been defrauded, and if so, who has defrauded him, and what redress can he obtain?

Before entering the competition he was distinctly given to understand that all the competitors entered upon an equal footing; that the unsuccessful ones were to be paid a sum supposed to cover the cost of making the drawings, their designs remaining their own property, to be returned to them immediately after one of them had been selected. It would seem, therefore, that the person or persons who instituted the competition had claimed, and in fact possessed, no right to use the designs they rejected, in any way, and that if they did use them, or any essential part of them, they became morally liable, at least, to the designer for such use. To try to enforce any such claim would be obviously difficult; and it would naturally be, to state the other side of the case, very tantalizing, after having selected from a number of designs the one which had on the whole the best arrangement, not to be able to make use of the many good suggestions embodied in the other designs.

The way out of this unpleasant relation between the owner and the architects, which must result in the long run in injury to both parties, would seem to lie in endeavoring to avoid the possibility of such complications, and that object would be obtained, could it be generally recognized that architects submitting designs in competition were to be paid, not for the cost of getting up the drawing, but for the value to the owner of their interpretation of a given problem. One of the results of such a recognition of the architect's services would be a tendency to reduce the amount of actual labor required to produce the drawings to the minimum consistent with a clear expression of the architect's main idea. The owner, being bound to employ the architect whose design he preferred, would chose only such men as inspired him with confidence in their taste and practical ability; all matters not pertaining to the general idea could therefore be disregarded in making the drawings; in many cases, plans alone, without elevations or perspectives, would amply suffice as a basis upon which to make a choice, so that, without withholding from the owner a fair and just equivalent for his expenditure, the architect could still, with perfect fairness, withhold his ideas upon many questions which he would be called upon to give at a later stage in the progress of the work, and then only in case he was the successful competitor.

One of the contributors to your paper has given, in two articles upon competitions, a number of very excellent suggestions with regard to the general conditions which should govern competitions. There is one point, however, which needs to be especially insisted upon; that is, that the competing architects should be placed in every way upon an equal footing, and bound by the same conditions, especially in the matter of remuneration. Of course, it is the right of every architect to place the value of his services as high or as low as he pleases; but in competitions an agreement should be arrived at between the owner and the architects, and every one should be bound to give his consent to such agreement. If the terms offered are not agreeable to any of the architects invited to compete, they can withdraw, or the owner can make the terms to suit such of them as he is most anxious to have compete. Otherwise, the considerations affecting the choice of a design cease to be considerations regarding only the relative merits of the designs submitted, and cease, therefore, to offer sufficient and proper guaranties to those of the profession who rely for their success upon their professional knowledge and ability.

B. W.

CORRESPONDENCE.

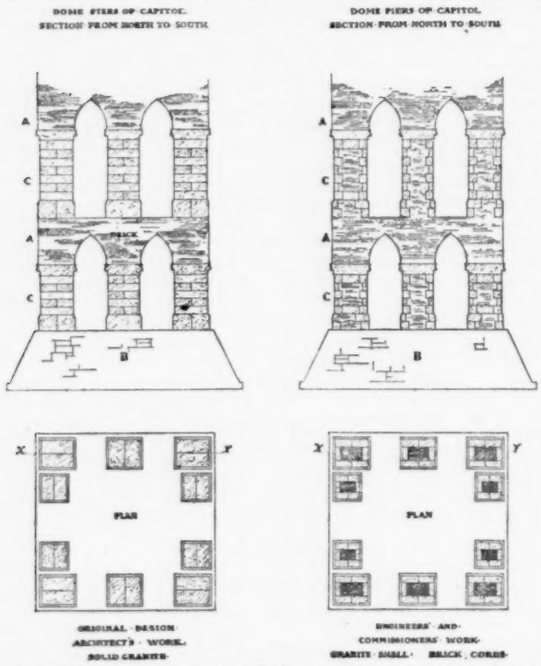
THE DOME PIERS OF THE HARTFORD CAPITOL.

HARTFORD, CONN., March 15, 1879.

As more than a local interest attaches to the recent investigation regarding the stability of the dome piers at the State Capitol in this city, a short account of the case may prove acceptable to the readers of the *American Architect*. At the annual session of the legislature, in the early part of this year, a committee was appointed to inquire into the construction of the dome piers, which it was alleged were insecure. The duties of this committee were: First, to discover if the dome was safe, and secondly, if it was not safe, upon whom the responsibility of faulty construction rested. It is impossible to give in detail the evidence called forth. Suffice it to say that at the sessions of the committee the opinions of the architect, the engineer, the builder, and others, were given, and the facts as established by the testimony can be summarized as follows: The trouble first arose from the substitution of brick and stone work in the dome piers in the place of the solid granite work shown in the plans prepared by the architect, Mr. R. M. Upjohn, of New York. The substitutions were made in the summer of 1874 by the superintendent, and provided for granite ashlar, with a core of brick, by means of which construction it was claimed the State would be saved an expenditure of $6,000. Without the architect's approval, the substituted plans, having received the sanction both of the consulting engineer, General Franklin, and the capitol commissioners, were placed in the hands of the contractor, Mr. J. G. Batterson, with orders to carry them out to the letter, despite his objection to the substitution of the brick instead of granite. In compliance with the superintendent's orders the granite was cut, and, having passed inspection both at the quarry and at the site, a portion of the blocks were put in place, being laid in cement mortar, according to the architect's specifications, the joints being a full quarter inch. For this latter reason the work was ordered to be taken down after three or four courses had been laid. Upon the refusal of the contractor to fulfil the order, and after a delay of two days, the order was made peremptory, and the work was reset, the joints being reduced to one sixteenth of an inch, and white lime mortar with a small proportion of sand substituted for cement mortar. The contractor remonstrated, but without avail, and during the setting

of the first-story piers hazarded no more advice on the subject. Regarding this point in the case, the commissioners blame the contractor for not making a personal appeal to them, and giving them the benefit of his advice and experience. In reply the contractor claims that by the terms of the contract, which made the decision of the superintendent "final and conclusive," the right of appeal was denied him. He further claims that his objections were made known to the engineer and the commissioners. The commissioners state that no change in plans could have effect without a written order from them; that they gave no written order, therefore the contractor is responsible. To this statement Mr. Batterson replies that the figured plans and drawings given him by the superintendent formed an order in writing, capable of interpretation by any good mechanic, and that it ill becomes the commissioners and the engineer, who not only approved the plans previous to their reception by the contractor, but also witnessed the laying of the stone, and accepted and paid for the same, to say that they issued no written order for the work; that what they did through their agent, they did themselves.

The accompanying illustration shows the two methods of construction of the piers, the solid granite originally designed by the architect, and the brick and granite work afterwards adopted by the engineer and the commissioners and carried into effect. A represents the brick work, and B the brown-stone foundations; C shows the granite.



It will be seen on inspection of the second sectional drawing that at the top of the piers, as well as at the base course, the granite work is built with binders extending across the piers, the intermediate space being filled with courses of brick. At this point an interesting development was made. When the president of the commissioners, acting on the advice of the engineer, sanctioned the change in the pier construction, it was with the understanding that the brick-work would do its part in sustaining the load above, but in the instance just cited this was not the case. It was discovered that the brick-work, in which there are eleven course joints to one in the granite, had settled away, there being a space of half an inch between the upper course of brick and the granite binders at the top of the piers. This demonstrates the fact that the granite shells of the several piers, and not the united strength of granite and brick, support the dome above, whose weight is twelve thousand tons.

An important question touching the workmanship of the granite pier blocks is raised by the commissioners. They claim that the beds of these blocks have "plug-holes," and are cut "slack," thus rendering them unfit for the work. "Plug holes" have been discovered by drilling into the joints for the purpose of introducing molten type metal. This charge is met by Mr. Batterson, who says that the superintendent ordered the grade and quality of the workmanship and that his orders were fulfilled, no complaint being made of any deviation from what was called for; if hammered beds were wanted they should have been ordered at the start.

It is clearly demonstrated that the lime mortar, in which a very small proportion of sand was used, has so shrunk away as to leave little or nothing for the beds. The use of this mortar was, however, in opposition to the advice of the contractor, and was demanded by the engineer and superintendent in charge.

With the execution of the work previous to the time when it was ordered to be taken down, and a change in the setting of the blocks was inaugurated, no fault has been found by the investigating committee, the work having been, in their opinion, thoroughly and properly done, and entirely capable of sustaining the superincumbent weight. And just here two grave errors in the management cannot but make themselves patent: First, injudicious action towards the architect, Mr. Upjohn, causing a change in his plans on the "penny wise and pound foolish" principle; and, secondly, incompetent interference with a competent master-builder. There is no evidence to support the assertion of your correspondent in the columns of the *American Architect* that the work was "scamped."

Arguments both by the commissioners and by Mr. Batterson, the contractor, were made before the special investigating committee in the Supreme Court room at the capitol, on Wednesday of last week. The arguments were thorough and exhaustive, and will have due consideration with the committee before the publication of their report, which at this writing has not made its appearance. While it is to be regretted that any poor constructional work should be found in a building so important as the State Capitol of Connecticut, yet it is conceded that the responsibility cannot be thrust upon the shoulders of the contractor, who was under strict orders, which, in the fulfilment of his duty, he obeyed, and to refuse which might have resulted in his discharge from the work.

The "cripping" of the granite pier blocks was first noticed in the autumn of 1875, when the imperfections were but slight. In 1878 the fractures increased to a greater extent, and upon consultation the most prudent course to pursue was adopted as above referred to: the use of type metal to produce an even bearing. The "cripping" is confined to the first story of granite piers, the work both above and below being sound. This story is fourteen feet and half an inch high. In the second story of the piers, the superintendent, who acknowledged his mistake in the work below, ordered the blocks to be set with quarter-inch joints, in the same manner as the work was originally begun by the contractor.

Touching the stability of the dome itself, it has been pronounced by the architect without settlement, and entirely safe. This statement is doubtless a boon to Connecticut people generally, after the harassing questions which have of late arisen. Chetwood.

ABSORPTION-DRAINS *versus* CESSPOOLS.

I have been much interested in the description given on page 85 (No. 168), under the caption The Plumbing in a First-Class Boston House, of an attempt to carry out Moule's system of subsoil irrigation as described by me in the *Atlantic Monthly*. The trial was, on the whole, a fair one, and the result was quite as satisfactory as I should have predicted, probably quite as satisfactory as its projector hoped for, — much more satisfactory, all things considered, than any cesspool system could be. At the same time, the arrangements were not altogether what they should have been, even after the described improvements had been made.

I have now applied this system in so many different situations and under such various circumstances, that I am able to prescribe the proper conditions more accurately than I could do when the *Atlantic* articles were written (1874). Some of these conditions were indicated in the instance recited by Mr. Clark. (1.) I believe it to be essential, whether the soil-pipe waste enters the drain or not, that the tight catch-basin be used; because even the flush-tank, under the rapid agitation of its discharge, will send out lumps of grease, etc., which ought to be sparingly admitted to the absorption drains. (2.) The catch-basin should receive the discharge of the flush-tank, in such a way as to cause the least possible disturbance of its floating scum or its sediment, — the best plan being, probably, to discharge the inlet-pipe exactly at the water level. The catch-basin should be about three feet deep below the water line, and its point of discharge should be ten or twelve inches below the water line. (3.) From the outlet of the catch-basin to the end of each absorption drain, the fall, which need not be more than two inches per hundred feet, must be absolutely continuous, so that a clean flow shall be provided at every point. Even the branches of the main drain should open from its bottom; this may be secured by turning the branches downwards until the point of junction between their invert and the invert of the main becomes the lowest point of the channel of the main. In the Lenox absorption field the branches open out from the bottom of the main and turn with quarter bends to the horizontal position. Boynton is now making branch pieces for this work in which the branches start at the level of the invert. (4.) The most important condition of all is, in my belief, the placing of the absorption drains very near to the surface of the ground. I have now had nine winters' experience with this system, — in one case north of Boston. My own drains lie from ten to twelve inches below the surface of the ground, and the earth in which they are placed has been frozen to a depth of three and a half feet. I have never heard of a case where frost has interfered in any way with the operation of the system. I am convinced that the question of frost may be entirely disregarded, — at least at a depth of ten inches. The nearer the surface, the more effective is the action of vegetation and of atmospheric oxidation. I regard ten inches as the *maximum* depth, and I shall not be surprised if future experience reduces it to six inches. The starting of the drains at a depth of sixteen to eighteen inches, in the case described, was, in my opinion, a defect. It is necessary to place the cemented pipe at — or near — this depth, but, if possible, the open-jointed drains should come nearer to the surface as soon as possible.

It is a good plan to close the outer ends of the absorption drains,

and thus to compel the liquid to escape at the joints. Where the flush tank is used it is well to have the drains gorged for a moment, to make sure that there is a tolerably even exudation throughout the system. It is not easy to make good work on an earth foundation, — especially where the ground has recently been brought to a new grade after building, and such shallow ditches are apt in any case to be dug too deep in places and to require filling. It has been my practice to lay the tiles on strips of board, but C. W. Boynton, of Woodbridge, N. J., is now making tiles especially for this purpose which simplify the process very much. They are "round tiles" lying in a continuous trough of larger half-rounds (breaking joints). The laying of stones beside the tiles, as described by Mr. Clark, is not necessary, — nor is it an improvement, for the stones will soon become imbedded in earth, with no open interstices, and will take the place of just so much absorbent material.

I have found the drains to work as well at intervals of four feet as at wider distances, and in case of need I should not hesitate to place them two feet apart.

The case described was — as compared with what we are accustomed to — a decided success. If all the foregoing conditions had been complied with it would have been a complete and permanent success.

GEO. E. WARING, JR.

THE EDDYSTONE LIGHTHOUSE AND THE TOUR DE CORDUAN.

THAT a structure which was so wholly original, and which was erected under such disadvantageous circumstances as naturally attended on the exposed site, should have resisted the storms of the Atlantic as long and as well as has been the case with this noble work, must always be considered as incontrovertible evidence of the genius of Smeaton. In course of time the tremor of the building, with each wave stroke from the westward, more especially during a storm from the west-south-west, has become more and more alarming. The joints of the masonry have yielded to the heavy strains thrown on them, and the sea-water has been driven through them into the interior of the building. The upper part of the structure, according to a report from Mr. James Nicholas Douglass, the worthy successor of Mr. Robert Stevenson as our chief living authority on lighthouses, has been strengthened on two occasions, viz., in 1839, and again in 1865, with strong internal wrought-iron ties, extending from the lantern floor downwards to the solid portion of the tower. On the last occasion it was found that the chief mischief was caused by the upward stroke of the heavy seas acting on the projecting cornice under the lantern gallery, which lifted the portion of the building above this level. After reducing the projection of the cornice about 5 inches, and well fastening the stones together with through bolts, no further leakage has occurred at this point. The tower is now in a fair state of efficiency, but the gneiss rock on which it stands, as anticipated by Mr. Stevenson, has been seriously shaken by the incessant sea strokes on the tower; and the rock is considerably undermined at its base. It has, therefore, been determined to erect a new tower on a spot which affords a good foundation, near low-water level, about 127 feet distant from the present site. The focal plane of the present lighthouse is at an elevation of 72 feet above high water. That of the new building will be 130 feet. The actual, useful range of the light, which is now about fourteen nautical miles, will thus be extended to seventeen miles and a half. On the completion of the new tower, it is intended to take down the present lighthouse to the level of the top of the solid work, 29 feet above high water at spring tides.

The new tower will be constructed entirely of granite. It will have a cylindrical base, 44 feet in diameter and 22 feet high, rising to 2 feet 6 inches above high-water springs. From this base will spring the shaft of the tower, the section of which will be a concave elliptic frustum, the generating curve of which has a major axis of 346 feet, and a minor axis of 74 feet. The diameter at the base will be 35 feet 6 inches, leaving around it a margin of 4 feet 3 inches as a landing platform. The height will be 138 feet above the rock to the top of the cornice, and the diameter of the tower, under the cornice, will be 18 feet 6 inches. The tower will be solid (with the exception of containing a water-tank) to the height of 25 feet 6 inches above high-water springs. At this level will commence the side-walls, with a thickness of 8 feet 6 inches, diminishing to 2 feet 3 inches at top. The tower will contain nine apartments, each 10 feet in height, in addition to the lantern, the uppermost seven being 14 feet in diameter. The whole of the work will be dovetailed and cemented, both horizontally and vertically, according to the system introduced by Mr. Stevenson, and adopted at the Hanois, Wolf, and Longships Rock lighthouses. The total cubic contents of the granite masonry will be about 69,000 cubic feet, and the estimated cost is £78,000.

The most magnificent lighthouse of modern times is the Tour de Corduan. It is built on a rock at the mouth of the river Garonne, on which river, at a distance of seventy miles from its mouth, stands the important commercial city and port of Bordeaux. The tower was commenced in 1584, under the reign of King Henri II., and was completed in 1610, in the reign of King Henri IV. The architect was Louis de Foix.

The island rock on which this great Pharos is built is exposed only at low water, when an area of 3000 feet of rock in length, by half that dimension in width, is left dry by the tides of the Bay of Biscay. On this rocky area is provided a cylindrical base, 135 feet in diameter, which is built solid up to 10 feet above high-water mark, with the exception of a cistern in the middle, and an opening for the stairs, which rise from the high water level. This opening is closed by heavy doors, and is reached by a ladder from the rock below, when the tide permits. The sides of this circular base have a batter of 5 feet; and around the platform of 125 feet diameter, thus arrived at, a wall is carried, 12 feet thick at its base, and 12 feet high.

On the centre of this circular area is erected the tower, which is 50 feet in diameter at its base, and consists of successively diminishing stories. The lower story is Doric; the second and third, Ionic; the fourth, Corinthian; the fifth, Composite. The interior was handsomely decorated and furnished; the apartments of the first and second stories being fitted for storerooms and for domestic use. The third story formed a chapel, 31 feet in diameter, and having a dome 40 feet high. Over this rose the Corinthian cupola, 21 feet in diameter, to the height of 27 feet. It had a stone balustrade around, and supported the lantern, which formed the summit, and which was 9 feet in external diameter, 5 feet within, and 17 feet high. The total height of this Pharos is 182 feet 6 inches.

When the tower was first built the light used was that of blazing wood, which was burned on a cresset in the lantern. Coal was afterwards substituted. The smoke rose through an opening of 18 inches diameter in the dome of the lantern, passed into a finial chamber above, and escaped by side openings.

In 1727 the lantern was destroyed, and an iron one substituted by M. Betri. In 1780 the catoptric system of illumination was introduced by Borda, and an Argand burner was placed in the form of a parabolic reflector of silvered copper. In 1810 the dioptric system of Fresnel replaced the catoptric method. The Argand lamp now used in this and in other French lighthouses contains four concentric circular wicks, which are supplied by pumps with a constantly overflowing supply of oil.

One reason for the ornate character of this lighthouse is said to be that it was designed as a part of the projected chain of water communication to connect the Atlantic with the Mediterranean. This is actually effected, on a minor scale, by the canal of Languedoc, which is 150 miles long, and connects the Garonne with the Mediterranean. — *The Builder.*

TIN-LINED PIPE.

BOSTON, March 21, 1879.

TO THE EDITOR OF THE AMERICAN ARCHITECT:

Sir, — I am informed by a prominent dealer in lead pipe, that there is now, and for a year or more past, no tin-lined lead pipe made and to be found in our markets having more than five per cent of tin in its lining. The consequence is, that the tin being applied to the lead while the latter is heated makes an alloy with it, and the pipe is therefore lined with a film of solder, which corrodes quickly, more quickly than lead alone, from the supposed galvanic action which always takes place when two metals joined together are exposed to the same fluid. I have seen pieces of this so-called tin-lined pipe, which have been in use only a year, riddled on the inside with holes, and looking like a small-pox subject. When tin-lined pipe was first introduced here, it contained some twenty-five per cent of tin. But the "improved processes" have reduced the lining till it has become worse than none, and its use for conveyance of drinking water should therefore be carefully avoided, unless it contains at least one fourth its weight in tin.

EDWARD S. PHILBRICK.

A GENERAL EXHIBITION OF CONTEMPORARY ART.

Boston Chapter of the American Institute of Architects, 1879.

THIS Society announces with pleasure that it has united with the Boston Art Club and the School of Drawing and Painting in the proposition to hold a general exhibition of contemporary art in the second story of the new wing of the Boston Museum of Fine Arts, which the trustees of the Museum have kindly placed at our disposal for this purpose.

The completion and opening of this extensive addition to the Museum building is an important event in the history of art in this city, and it seems desirable that, in the proposed exhibition, the interests of architecture should be represented by the side of those of painting and sculpture in a manner to reflect credit upon the profession, and to justify the increasing interest of the public in our art.

The aid and coöperation of the profession generally is earnestly solicited in this undertaking.

The exhibition will open on Tuesday, April 22, and will close on Saturday, May 24, during which period no work mentioned in the catalogue can be withdrawn from the galleries.

Contributions intended for this exhibition may be sent to the Museum of Fine Arts until Saturday, April 12, after which date no works will be received.

Drawings within the city limits will be collected and returned through the agency of Messrs. Williams & Everett, free of charge to contributors. Charges for transportation, both ways, of contributions to the exhibition will be paid by the Museum of Fine Arts. No pecuniary liability for drawings in transit is assumed by the manage-

ment, but insurance in transit will be effected to the extent desired by the owners, without cost to them, upon their written request. As the Museum building is fire proof it is deemed unnecessary to insure during the exhibition, and efficient means will be taken to guard and protect the property entrusted to the management, and to insure its safe return to the owners.

The annexed schedule should in all cases be carefully filled out and signed by the exhibitor in accordance with the printed directions thereon, and sent by mail to the Secretary of the Boston Society of Architects on or before Monday, April 7.

All architectural drawings will be submitted to a committee of the Society, who will vote upon each drawing separately and decide upon its acceptance or rejection.

Part of the space assigned being furnished with glazed upright cases, a certain proportion of unglazed and uncovered drawings may be sent, but glazed drawings are preferred.

E. C. Cabot, *President.*
Henry Van Brunt, *Secretary.*

Boston, 2 Pemberton Square, March 25, 1879.

NOTES OF EXPERIENCE AND INEXPERIENCE.

16. Terne Plate. —Terne plates are made of sheet iron covered with lead, in distinction from the bright tin plates, in which the covering is of metallic tin. The tin undoubtedly forms the best and most durable coating, but it is so expensive that the manufacturers reduce the thickness to the utmost, in their competition with each other, and the consequence is that on plates of average quality it forms a mere film at the upper part of the plate; so that the terne plates where the coating, though of inferior metal, is thicker, are perhaps preferable, at least for roofing purposes. C.

17. Cow-Dung in Mortar. — As a subscriber and careful reader of your valuable magazine, I have been much interested in your recent articles on chimneys and fireplaces. I have for some time had in mind, however, to write and ask for the reason for a receipt given in your issue for November 23, 1878, in an article headed, "Hints on Building Chimneys," section 5. Please have your practical chemistry man give in your next number the reason *why* a chimney should be "pargetted" with a mortar made of such proportions as there given, namely, "one part fresh cow-dung and three parts ordinary mortar." It is a specification that would make brick layers growl not a little at being compelled to carry out, unless a good reason could be given for it, and this for my own satisfaction at least, if not for theirs, I trust you will give. I am one of those who believe that the way to gain desired information, on just such points as this, is to ask of the practical workman, as well as the chemist, "Why?" Subscriber.

NOTES AND CLIPPINGS.

Erratum. — In the last paragraph of the article Recent Pictures in New York, printed in our last issue, the writer was made to speak of the artists represented in the Knœdler collection as "sentimental" artists, whereas "continental" was the adjective used.

Spontaneous Combustion. — There was an interesting discussion on this subject at a recent meeting of the French *Académie des Sciences*. M. Cosson described an accident which had occurred in his laboratory a few days before. While the narrator was working in the laboratory, a portion of the boarding of the floor spontaneously took fire. The boards were in the vicinity of an air-hole, fed with warm air from a stove four metres away on the floor below. A similar accident took place two years ago, and in consequence M. Cosson had the boards adjoining the air-hole replaced by a slab of marble. The boards which now ignited adjoined the marble. The heat to which the boards were subjected was, however, very moderate, being only that of warm air at 25° C. Nevertheless, M. Cosson said the wood had undoubtedly been slowly carbonized. Being thus rendered extremely porous, a rapid absorption of the oxygen of the atmosphere had resulted, and sufficient caloric was thereupon produced to originate combustion. The danger thus disclosed, said M. Cosson, is one to which the attention of builders ought to be directed. In the instance in question, M. Cosson was able to extinguish the fire with a little water, as he was present and witnessed its beginning; but had it occurred at night, during his absence, it would undoubtedly have completed its work of destruction. M. Faye stated that at Passy, a few days before, a similar case of spontaneous fire, due to the action of the warmth from the air-hole of a stove upon the wood-work, had occurred at the house of one of his friends. — *Manchester (Eng.) Cotton.*

Tenement-Houses in Boston. — The examination of 2,700 tenement-houses in the city of Boston, which has just been completed, shows that nine tenths of them are in fair order so far as the requirements of the law are concerned. Improvements have been ordered in those which are found to be faulty in construction or arrangement.

A Nickel Mine in Massachusetts. — At Dracut, three miles from Lowell, a cave which was thought to be of nature's make has proved to be a mine shaft, eight feet in diameter and some forty feet deep, which is supposed to have been driven nearly two centuries ago by the early settlers, who mistook for indications of silver the indications of nickel, which is the metal actually found. A company has been formed to work the mine, which promises to develop satisfactorily.

Compressed Air in Blasting. — Mr. W. E. Garforth, of Dukinfield, has exhibited before the Manchester (Eng.) Geological Society an arrangement for using compressed air in blasting, at a pressure of eight thousand pounds and more per square inch.

Town Heating by Steam. — Baltimore is the last city that has made a movement toward adopting the Holly system of town heating by steam.

Tree Planting in Massachusetts. — By the following circular, attention is drawn to the necessity of restocking our wood and forest lands, — a necessity which will before many years be as apparent in Maine and Michigan as it already is in Massachusetts.

Office Massachusetts Society for Promoting Agriculture,
5 Pemberton Square, Boston, March, 1879.

The attention of Massachusetts land-owners is called to the following State law, passed by the legislature of 1878, and entitled "An Act concerning Plantations of Timber Trees and the Tax thereon:" —

"All plantations of timber trees in this Commonwealth, upon land (not at the time of said planting woodland or sprout land, and not having been such within five years previously), the actual value of which, at the time of planting, does not exceed fifteen dollars per acre, of any of the following kinds, to wit: chestnut, hickory, white ash, white oak, sugar maple, European larch, and white pine, in number not less than two thousand trees to the acre, shall, together with the land upon which the same are situated, be exempt from taxation for a period of ten years from and after said trees shall have grown in height four feet on the average, subsequently to such planting: provided that said exemption shall not extend beyond such time as said land shall be devoted exclusively to the growth of said trees; and provided, further, that the owner or owners of such plantations shall appear before the Board of the Assessors in the towns where the same are located and prove to the satisfaction of such Board the herein-mentioned conditions.

"Sect. 2. This act shall take effect upon its passage.

"Approved April 9, 1878."

Thomas Motley, *President.*
Edward N. Perkins, *Secretary.*

Japanese Bronzes. — Mr. Consul Flowers, in a report on the commerce of Hiogo and Osaka, Japan, lately issued by the Foreign Office, thus speaks of the manufacture of Japanese bronzes: "The moulds, which of course vary according to the shape of the vase or bowl it is desired to make, are made of wood, sometimes covered with straw. On this a coating of clay is placed; over this comes a layer of wax, which is moulded into the design required. Another thick coating of clay is then added, and the inner wooden mould being taken out the orifice at each end is closed. Two holes are then made at one end connecting with the layer of wax, so as to enable the wax, when melted, to run out, and through these the molten bronze enters, filling the interstices occupied by the wax. The subsequent process of casting is of the rudest kind. The earthen mould is placed in a small clay oven hollowed out in the floor of the workshop, the size of which depends upon that of the casting. The oven is then filled with charcoal and closed, with the exception of a circular opening at the top, on which a chimney, a foot or so high, is built of wet clay. The oven is connected underground with a wooden bellows, protected from the sparks and heat from the furnace by a small earthen or stone wall a foot high, and which is worked by hands and feet. The first operation is to melt the wax, which runs out, leaving the impression of the design stamped firmly in the surrounding layer of clay. This done, the mould is taken out and allowed to cool. It is then put a second time into the furnace, as before, and the molten bronze is then poured into the mould through the holes by which the wax escaped. After the bronze has filled the mould the chimney is knocked off, the oven supplied with fresh charcoal laid evenly around the mould, and a lid being put on the oven, furnished with small perforated holes, the bellows are set to work again for an hour or more, according to the size of the casting taken. This operation generally occupies a day. When the casting is taken out of the oven, the earth outside and inside is scraped off, and reveals the vase or bowl in a rough state. It is then put into the hands of rough workmen, boys being mostly employed in this part of the work, by whom it is polished and scraped with a knife until it presents a smooth surface. It then passes on to the carver, who fills in the details of the designs. When his work is done the vase or bowl is dipped into a boiling solution of vinegar, sedge, and sulphate of copper, in order to give it the proper color. A few finishing touches in the way of polish are added, and the article is finished and ready for sale."

Were the Mound-Builders Cannibals? — The New York *Times* says that a mound similar to those so common in our Western States was recently found and opened in Japan, and scientific examination of its contents affords ground for a very strong argument that cannibalism was practised, perhaps habitually, by some of the ancient inhabitants of that country. That the Omori mound was not a tomb was sufficiently shown by the fact that the skeletons found in it were never complete, and that the bones lay about in disorder, and in no relation to each other, whereas the bones of buried bodies would be found approximately in some position possible in life. Moreover, the human bones were found among those of other animals, and, like them, were broken into lengths convenient for cooking and eating, and were deeply scratched in those portions, such as the joints, from which the eater would find most difficulty in removing the flesh. The discovery is a curious one, as it is the first indication of cannibalism among a people whose characteristics as at present known do not suggest the practice by them of such a custom. But similar evidence has been held by archæologists sufficient to prove the former existence of cannibals in North America.

The Cause of Avalanches. — It is very well known to those who have travelled in the Alps, that the inhabitants believe that avalanches rarely fall when the sky is overcast, but that they frequently do so when the sky grows clear. In winter the monks of St. Bernard always urge travellers not to leave the monastery when the sky is clearing, and many times those who have neglected that advice have fallen victims to their imprudence. M. Dufour, in a paper read before the Paris Academy of Sciences, endeavors to explain the phenomenon by reference to the contraction and decrease of strength of snow and ice under decrease of temperature. "In cold weather," he says, "when the sky clears off the temperature falls, especially just before sunrise, and then the filaments of ice which retain the snow on the slopes of the mountains contract and snap, the mass begins to slide, and draws others in its train; for the slightest cause of movement, a shout or the smallest shock, may cause the fall of enormous avalanches." A circumstance of which M. Dufour was a witness confirmed him in his views. A meadow of several acres in extent had been prepared at Morges for skaters by covering it with water, which froze while the heavens were covered. One night the sky cleared off, and M. Dufour noticed a sensible fall in the thermometer. Immediately afterwards he heard crackings in all directions, due to the contraction of the ice from the increased cold, and numerous splits were observable. That phenomenon is precisely analogous to what occurs when the heavens clear up and cause the fall of avalanches. — *Van Nostrand's Engineering Magazine.*